

DSD  
DISK DRIVE  
AC POWER DOWN CIRCUIT

Field Installation Manual  
for  
DSD Part No. 900382-01  
Retrofit Kit

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## 1.0 INTRODUCTION

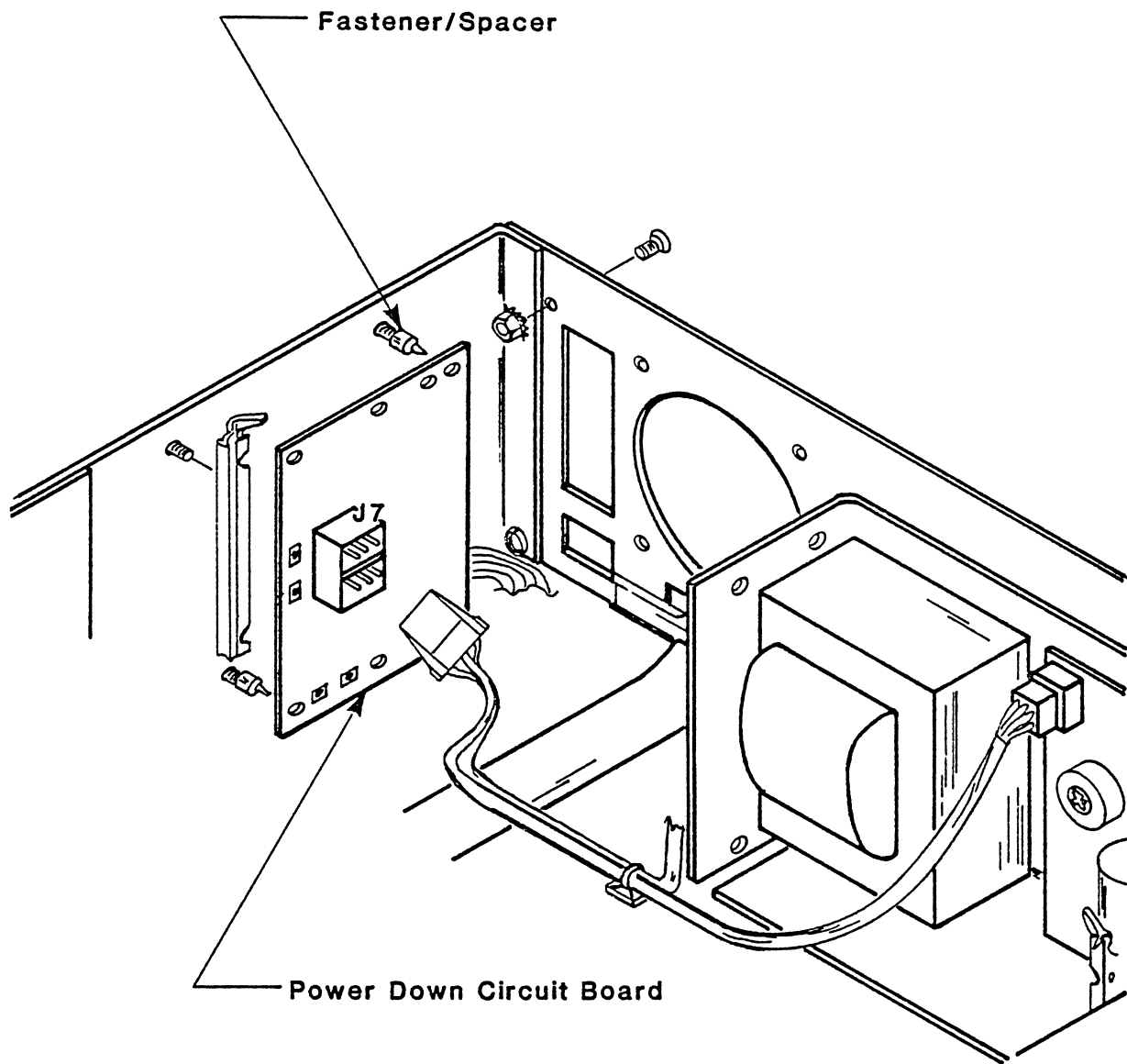
The Disk Drive AC Power Down Circuit (DSD Part No. 900382-01) is designed as a factory installed option, or as a retrofit kit for DSD 110, 430, 440, 470, and 480 Systems equipped with the power harness.

The circuit functions not only as an energy saving device, but also enhances the reliability of the SA800 or SA850 Disk Drives.

## 2.0 INSTALLATION

The retrofit kit contains the printed circuit card and necessary hardware. See Figure 2-1 for mounting the printed circuit card, and making harness connections. Proceed as follows:

1. Disconnect ac power to main chassis and remove top cover.
2. If installation is being accomplished on a DSD 440 or 480 main chassis, disconnect cables from the controller board; remove the controller board.
3. Remove the connector from the CORCOM filter circuit board and the two black wires connected to the ac power ON/OFF switch.
4. There are four threaded studs projecting in from the side of the chassis near the rear panel. These studs will be used to install the power down circuit board. Fold the harness wiring back out of the way and screw the four plastic spacers from the kit onto these studs.
5. Orient the power down circuit board so the components are facing toward chassis sidewall. TP2 and TP3 are at the bottom of the board, and J7 is toward the front of the chassis. Align mounting holes and push the board down on the plastic fasteners that are part of the spacers. Refer to Figure 2-1.
6. Replace black leads and filter connector removed in step 3. Remove jumpered plug (orange and black wiring) from cable tie wrapped to main harness and leave it dangle. Plug the cable connector into J7 on power down circuit board.
7. If necessary, reconnect cables to the controller board and reinstall the controller board in chassis slots.
8. Jumpers W1 and W2 are shipped from the factory in disable position. Check that these jumpers are in terminals 1 and 2 for normal operation (see schematic diagram and markings on printed circuit board).
9. Reconnect ac power to main chassis. Place power switch to ON and check circuit operation.
10. Replace top cover. Installation is complete.



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Figure 2-1. Installation Diagram

### 3.0 THEORY OF OPERATION

The Power Down Circuit Assembly is powered by the +24 Vdc output of the power supply. Any changes within the ten percent tolerance specified for this supply voltage will have no affect on the power down circuit.

The circuit (see schematic diagram) consists of a resistive divider string in a psuedo-bridge configuration. This resistive divider is connected across a small, non-inductive resistance (R6) in series with the +24 Vdc supply line. The inputs to comparator U2A are connected to the resistive bridge and sense any voltage shift across resistor R6.

When the current in the +24 Vdc supply line exceeds approximately 0.5 ampere (drive selected, drive stepping, and head loaded), the output of U2A is driven low which effectively grounds both sides of the charging capacitor C3. The trigger input voltage holds the output of timer U1 low which turns on K1 and supplies ac power to drive 0. At the same time, comparator U2B is switched on, effectively grounding the control of K2 and supplying ac power to drive 1.

If the drive(s) is/are deselected, comparator U2A senses the voltage change across R6. Its output goes high and starts a timing cycle. Capacitor C3 is now allowed to charge through resistor R4, which is chosen to afford a ten minute delay time. During this timing cycle the timer (U1) output is held low, keeping K1 and K2 turned on, and supplying ac power to the drives.

#### NOTE

The timing cycle for the DSD 110, 430, and 470 products is approximately ten minutes. For the DSD 440 and 480 products it is approximately 12 minutes. The difference is due to an additional two minute delay, software controlled, by the DSD 440/480 controller module.

When the charge on C3 reaches 2.0 volts, the output of the timer U1 is switched high, K1 is turned off, and ac power is removed from drive 0. The change in the output of timer U1 is sensed by U2B which also switches off, opening K2 and removing ac power from drive 1.

If during the timing cycle (charge time of C3) a drive reselect is made, the timing cycle will be aborted. Comparator U2A output will go low, discharging C3. The trigger input to U1 will keep the output low, K1 and K2 (through comparator U2B) will be turned on, and both drives will be supplied ac power.

Capacitors C1 and C2, and resistors R1 and R2 are placed across the ac supply lines to compensate for inductive phase shift of current and voltage within solid state relays K1 and K2.

Terminals and jumpers W1 and W2 are factory installed in the disable position as shown on the schematic diagram. Jumpers W1 and W2 must be repositioned for circuit to work.

## 4.0 MAINTENANCE

### WARNING

Hazardous voltage levels are present in and around the power supply, the power down circuit board, and the power distribution panel. Technicians performing tests with the power on, MUST observe standard safety practices. Failure to heed this warning may result in serious injury or death.

Recommended test equipment includes any high impedance (10 megohm or more) VTVM/DVM, and any oscilloscope capable of measuring dc to 10 MHz or more.

Figure 4-1 shows the physical location of the following test points:

- TP1 (output of U2A). This test point is used to observe the rising voltage charge on C3 during a timing cycle. With drives selected, the output at TP1 should be at, or near ground potential.
- TP2 (output of U1). This test point is at ground potential when ON and near +24 Vdc when OFF.
- TP3 (output of U2B). Same as at TP2.
- TP4. Ground for testing and maintenance.

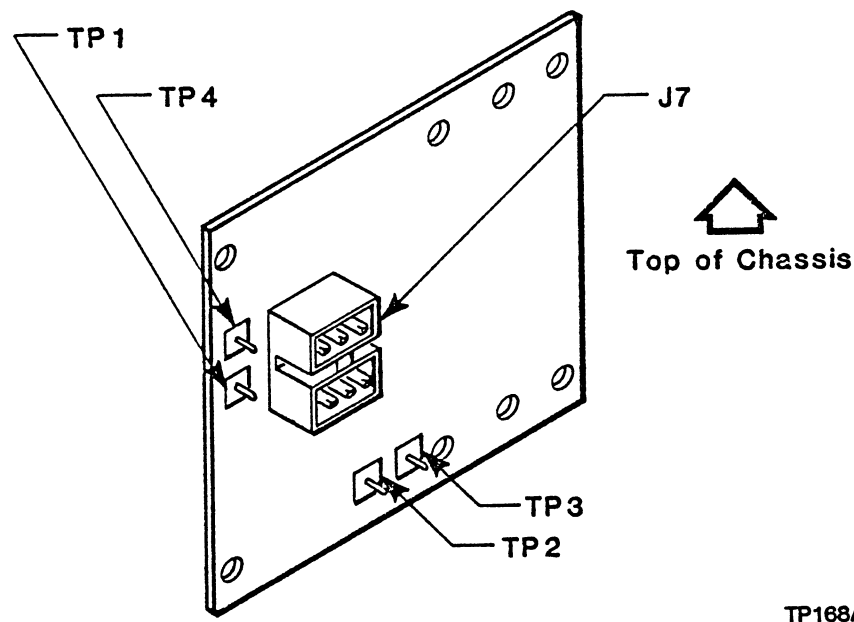


Figure 4-1. Test Point Locations

#### 4.1 Troubleshooting

A. SYMPTOM: Drives do not operate. No ac power to drives.

Possible Causes:

- (1) +24 Vdc power supply
- (2) AC cables improperly connected.
- (3) U1 defective.

Corrective Action:

- (1) Check +24 Vdc supply and cables.
- (2) Check cable connections.
- (3) Replace U1.
- (4) If fault is not +24 Vdc supply, operation can be restored by disconnecting J7 from power down circuit board and installing the tie wrapped jumper connector. This disables (bypasses) the power down circuit.

B. SYMPTOM: Drive 0 is OK. Drive 1 is not.

Possible Causes:

- (1) U2B defective.
- (2) K2 defective.

Corrective Action:

- (1) Replace U2.
- (2) With power OFF, check for open between pins 1 and 16 of suspected relay. (Internal Diode and series resistor.) Replace if necessary.

C. SYMPTOM: Drive 1 is OK. Drive 0 is not.

Possible Causes:

- (1) U1 defective.
- (2) K1 defective.

Corrective Action:

- (1) Replace U1.
- (2) With power OFF, check for open between pins 1 and 16 of suspected relay. (Internal Diode and series resistor.) Replace if necessary.

D. SYMPTON: On initial turn-on, drives operate for timing cycle then lose power.

Possible Causes:

- (1) U2A defective.

Corrective Action:

- (2) Replace U2.



E. SYMPTOM: Drives continue operation after time out period.

Possible Causes: (1) U2A defective.

(2) U1 defective.

(3) C3 leaking.

Corrective Action: (1) Replace defective component.

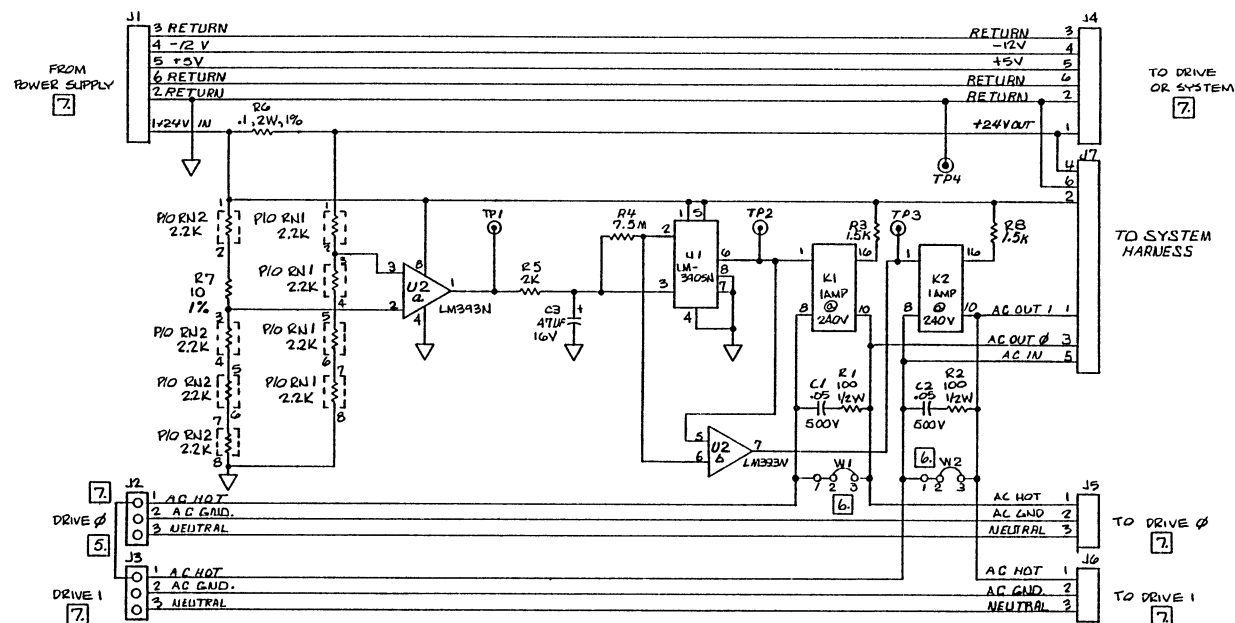
## 5.0 MAINTENANCE DOCUMENTS

Contained herein are the power down circuit parts list and schematic diagram.

Table 5-1. Parts List, AC Power Down Circuit

ITEM	PART NO.	DESCRIPTION	QTY	REMARKS
1	150018	Header, Berg Stick, TP1 - TP4	4	
2	170034	Relay, 1 amp @ 240V, K1, K2	2	
3	200018	Resistor, 7.5 megohm, 1/4W, 5%, R4	1	
4	200022	Resistor, 2 Kohm, 1/4W, 5%, R5	1	
5	200027	Resistor, 100 ohm, 1/2W, 5%, R1, R2	2	
6	200043	Resistor, 1.5 Kohm, 1/4W, 5%, R3, R8	2	
7	200048	Resistor, 10 ohm, 1/4W, 1%, R7	1	
8	200049	Resistor, 0.1 ohm, 2W, 1%, R6	1	
9	230040	Resistor, SIP. 2.2 Kohm, 8 Pin, 2%, RN1, RN2	2	
10	250041	Capacitor, 0.05 uF, 500V, 20%, Ceramic Radial, C1, C2	2	
11	260007	Capacitor, 47 uF, 16V, C3	1	
12	320003	IC, LM393N, Voltage Comparator, 8 Pin Dip, U2	1	
13	32004	IC, LM3905N, Timer, 8 Pin Dip, U1	1	
14	130032	Connector, Jack, W1, W2	6	-01 Only
15	130044	Shorting Plug, Insulated, W1, W2	2	-01 Only
16	150027	Connector, Socket, Header, 6 Pin, J7	1	-01 Only
17	150027	Connector, Socket, Header, 6 Pin, J1, J4	2	-02 Only
18	150036	Connector, Socket, Header, 3 Pin, J2, J3, J5, J6	4	-02 Only

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE
1		ENG/VER/ING RELEASE	4-30-81
2		PER EGO 368	5-11-81
3		PER EGO 390	5-22-81



- NOTES: UNLESS OTHERWISE SPECIFIED
- THIS DRAWING REFLECTS ARTWORK NO. 820017.
  - ALL RESISTOR VALUES ARE IN OHMS AND ARE 1/4W, ±5%.
  - ALL CAPACITOR VALUES ARE IN μF AND ARE ±20%.
  - WIRE JUMPER FACTORY SOLDERED FROM J2 PIN 1 TO J3 PIN 1 (FOR -O1 VERSION)
  - W1 AND W2 ARE SHOWN IN DISABLE POSITION, (FOR -O1 VERSION).
  - J1-J6 CONNECTORS ARE USED ON -O2 VERSION ONLY.

ITEM NO.	QTY	PART NUMBER	DESCRIPTION	MFG
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES				
DRAWN: [Signature] DATE: 4/2/81				
CHECKED: [Signature] DATE: 5/3/81				
DESIGN: [Signature] DATE: 5/11/81				
PROD. ENG: [Signature] DATE: 5/14/81				
MFG. ENG: [Signature] DATE: 5/14/81				
800017 110 430			PCB SCHEMATIC, UNIVERSAL POWER DOWN	
800017 443 121			CODE IDENT NO. 830017	
NEXT ASSY USED ON			DO NOT SCALE DRAWING	
SCALE: 1/16"			SHEET 1 OF 1	